Investment strategy
for Monthly Housing Charges

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1 Target Client

Client profile

Investment Objective:

Preparing for **Monthly housing charges** 350,000 KRW = 308.30 USD [2021.06.19.]
total 308.30 * 24 = **7,399 USD**

Investment Period: 2 years

Initial Outlay:

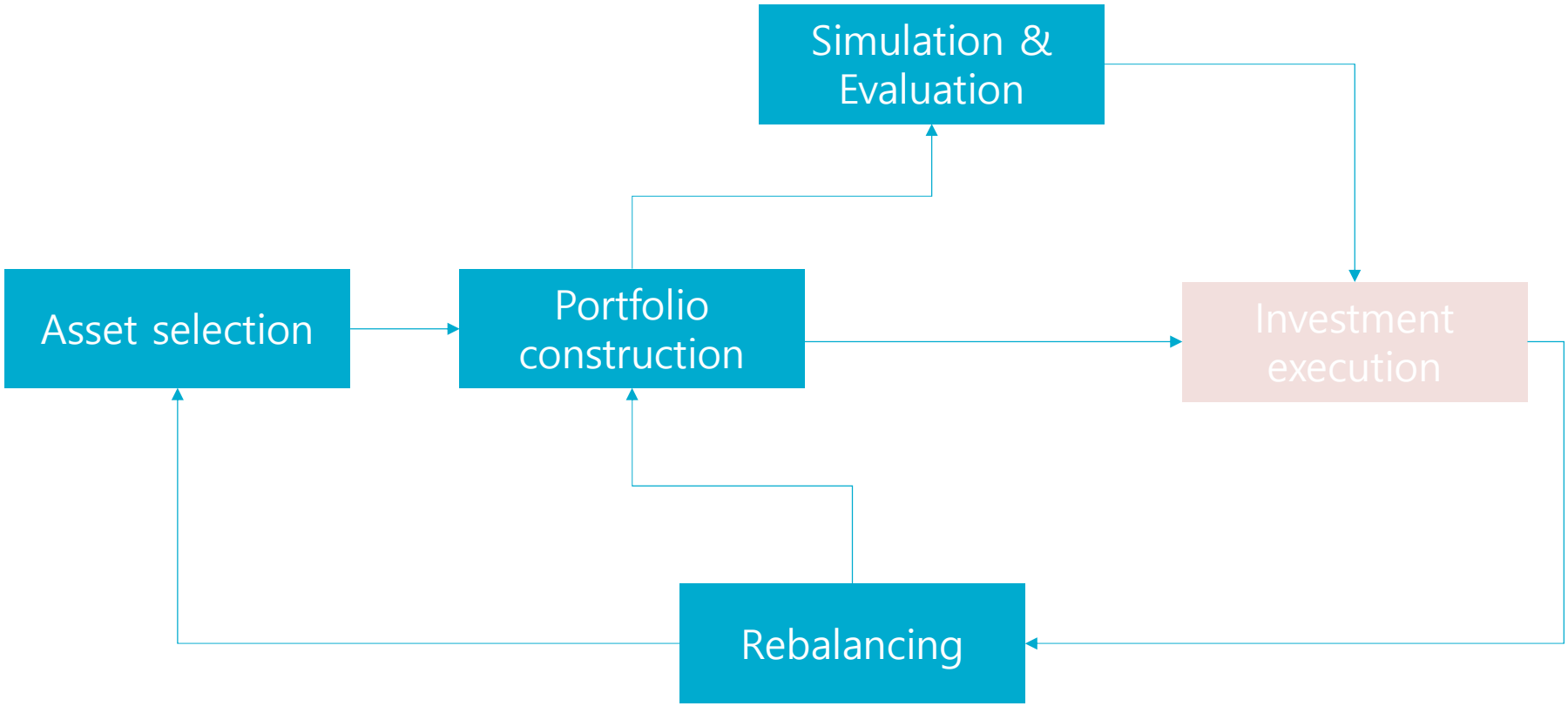
50,000 USD = 56,762,500 KRW

Target rate of return:

Total: 14.8%
Annual: 7.14%

2 Investment Strategy

Chart Flow



2 Investment Strategy

1. Universe of Securities & Asset selection

Candidates of Asset classes

Individual Stocks which are at least 6-months closing price data existing in S&P500 as of the investment.

(For historical simulation)

Factor for Asset selection

Use **Accelerating dual momentum**(ADM) method

- Calculate 1, 3, 6-months averaged rate of return. → ADM score
- Select the **Top 10** securities which have highest ADM.

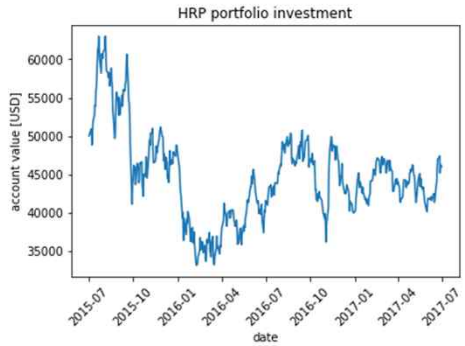
2 Investment Strategy

1. Universe of Securities & Asset selection

Data description

- S&P500 data crawled by **FinanceDataReader**
- Used-data period: 2015.01.02 ~ 2021.06.18
- The number of stocks: 504

Healthcare Industry →



https://github.com/FinanceData/FinanceDataReader

2 Investment Strategy

2. Portfolio Construction

Portfolio Construction

Use **Hierarchical Risk Parity Portfolio** (HRP portfolio)

- Only assets within the same group compete for allocation with each other rather than competing all the assets in the portfolio.

$$\alpha_1 = 1 - \frac{V_1}{V_1 + V_2}; \alpha_2 = 1 - \alpha_1$$

$$W_1 = \alpha_1 * W_1$$

$$W_2 = \alpha_2 * W_2$$

- Top-down fashion, More intuitive

Construct the **optimal portfolio** in the **latest 6 months**.

https://hudsonthames.org/an-introduction-to-the-hierarchical-risk-parity-algorithm/

2 Investment Strategy

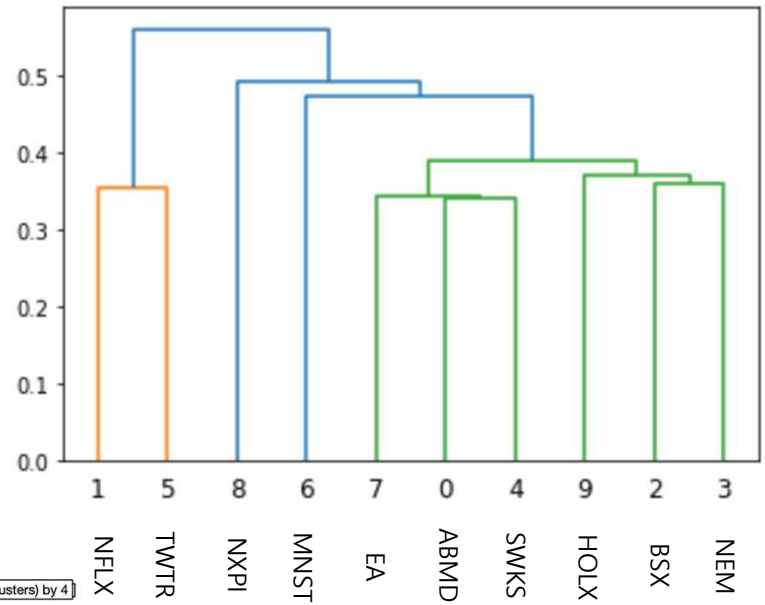
2. Portfolio Construction

HRP Portfolio

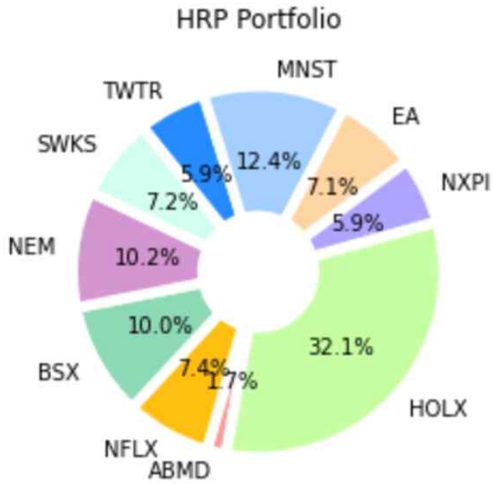
Used-data period : 2015.01.01 ~ 2015.06.30. (6 months)

Linkage matrix

	0	1	2	3
0	0.0	4.0	0.340672	2.0
1	7.0	10.0	0.342505	3.0
2	1.0	5.0	0.355073	2.0
3	2.0	3.0	0.359797	2.0
4	9.0	13.0	0.371020	3.0
5	11.0	14.0	0.390413	6.0
6	6.0	15.0	0.474706	7.0
7	8.0	16.0	0.491564	8.0
8	12.0	17.0	0.561179	10.0



the optimal portfolio in the latest 6 months



df_link shows a linkage matrix with structure $Y = \{(y_{m,1}, y_{m,2}, y_{m,3}, y_{m,4})\}_{m=1,\ldots,N-1}$ -> [(# of Clusters) by 4]

$(y_{m,1}, y_{m,2})$: Merging clusters

$y_{m,3}$: distance between $y_{m,1}, y_{m,2}$

$y_{m,4}$: the number of original items included in cluster m

2 Investment Strategy

3. Rebalancing

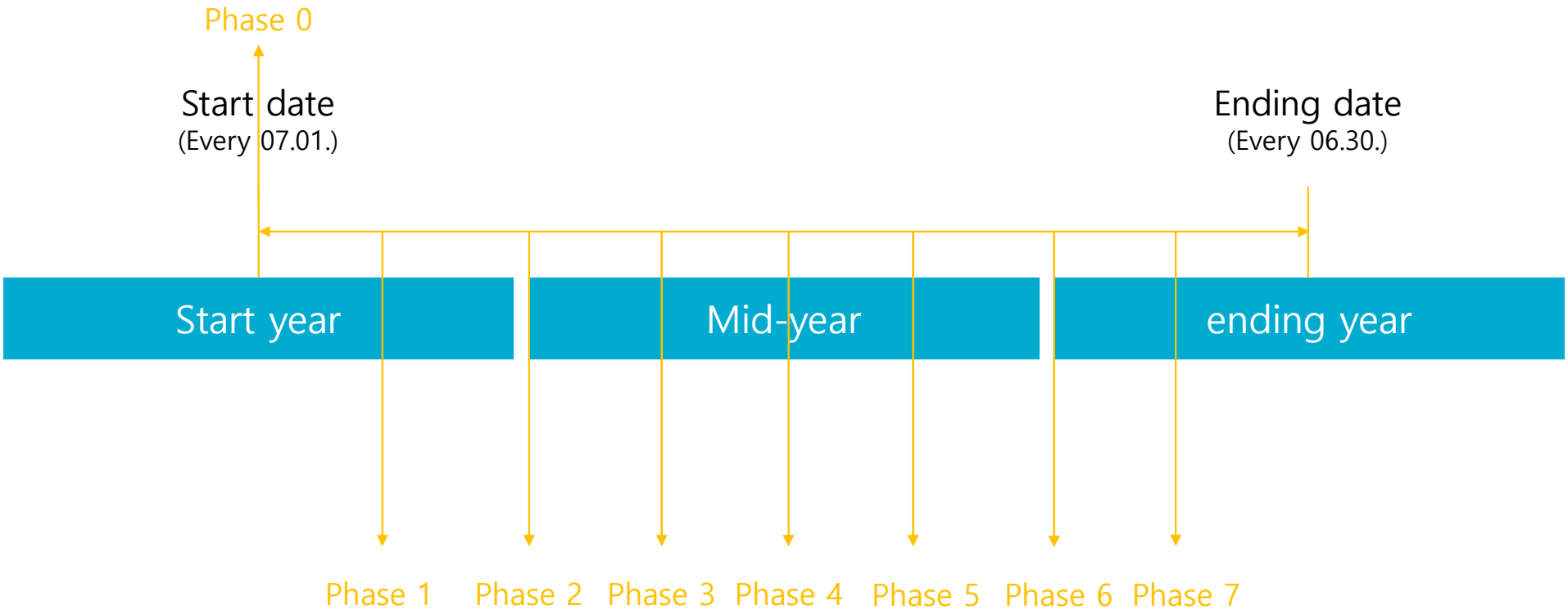
Rebalancing

- Every quarter
- Use **Resampling every stocks** (10 stocks) and **constructing a portfolio** method.
  - ADM method
- Construct the **optimal HRP portfolio** in the **latest 6 months**.

So, total 8 portfolios are made during one investment. (2 years)

2 Investment Strategy

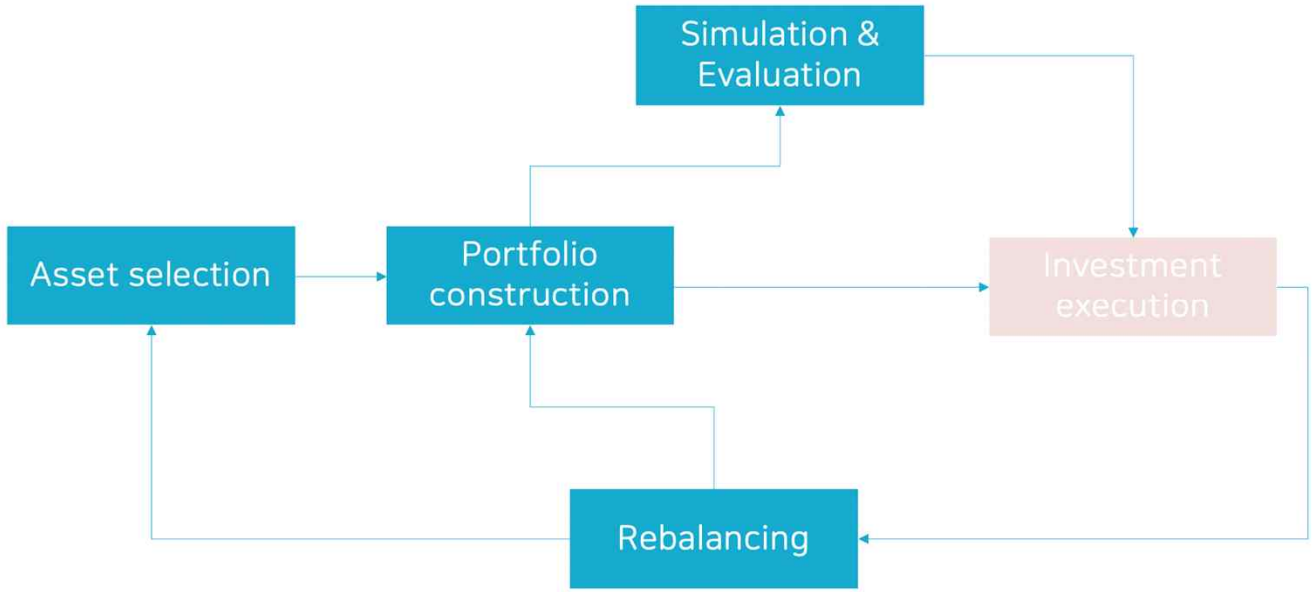
3. Rebalancing



Rebalance the portfolio every quarter

3 Investment execution

NOTE



Experiment

1. Select stocks using ADM method.
2. Construct the HRP and MVO portfolio.
3. Every 3 month, Rebalance the portfolio.
4. Test this strategy with historical data and Evaluate it.

3 investments
2015 ~ 2017
2017 ~ 2019
2019 ~ 2021 (06.18.)

3 Investment execution

1. 2015 ~ 2017 investment

Contents of 2015 Portfolios

Phase 0: 'NBIX', 'ABMD', 'HZNP', 'QURE', 'EXEL', 'ICPT', 'HALO', 'PGEN', 'NVAX', 'PRTA'

Phase 1: 'ARNA', 'GLPG', 'SRPT', 'BLUE', 'RARE', 'RGEN', 'ENTA', 'VTRS', 'EXEL', 'ACAD'

Phase 2: 'MTEM', 'EXEL', 'ABMD', 'DBVT', 'SLP', 'PRTA', 'LHCG', 'SRPT', 'ICLR', 'GLPG'

Phase 3: 'IMUX', 'ACRS', 'PACB', 'PCRX', 'MGNX', 'CGC', 'ISEE', 'ACB', 'KDNY', 'CYTK'

Phase 4: 'SIEN', 'MESO', 'NVTA', 'INO', 'TFX', 'SYK', 'PGEN', 'CPSI', 'ANIK', 'HCA'

Phase 5: 'XBIT', 'RLMD', 'EXEL', 'EVH', 'MDGL', 'CCXI', 'GKOS', 'LCI', 'NTRA', 'ITCI'

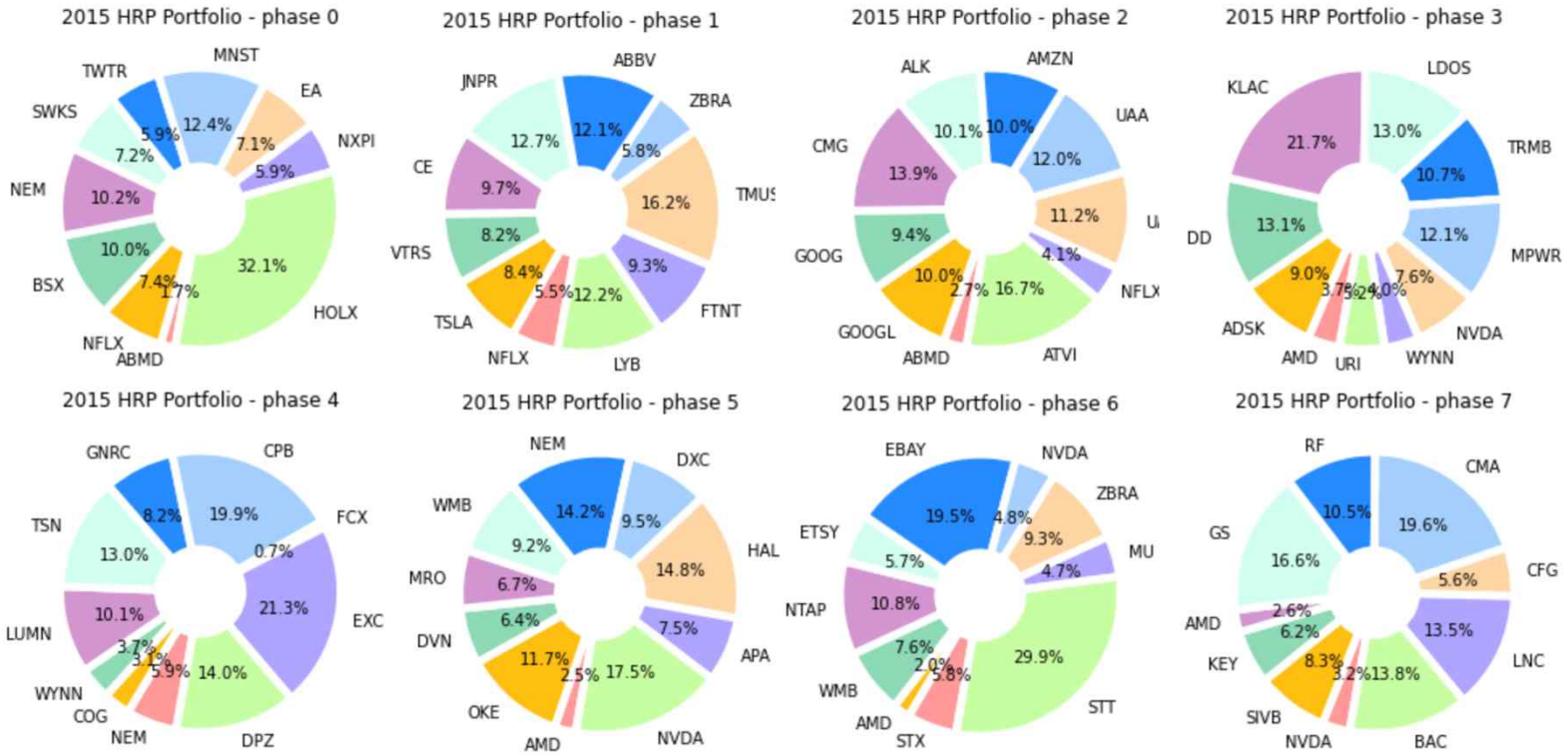
Phase 6: 'ARAV', 'APYX', 'KURA', 'PBYI', 'TVTY', 'ACB', 'SRPT', 'CLVS', 'RGNX', 'PRTA'

Phase 7: 'CGC', 'ACB', 'RGNX', 'CUTR', 'MDGL', 'MGLN', 'CYTK', 'ITGR', 'BCRX', 'CCXI'

3 Investment execution

1. 2015 ~ 2017 investment

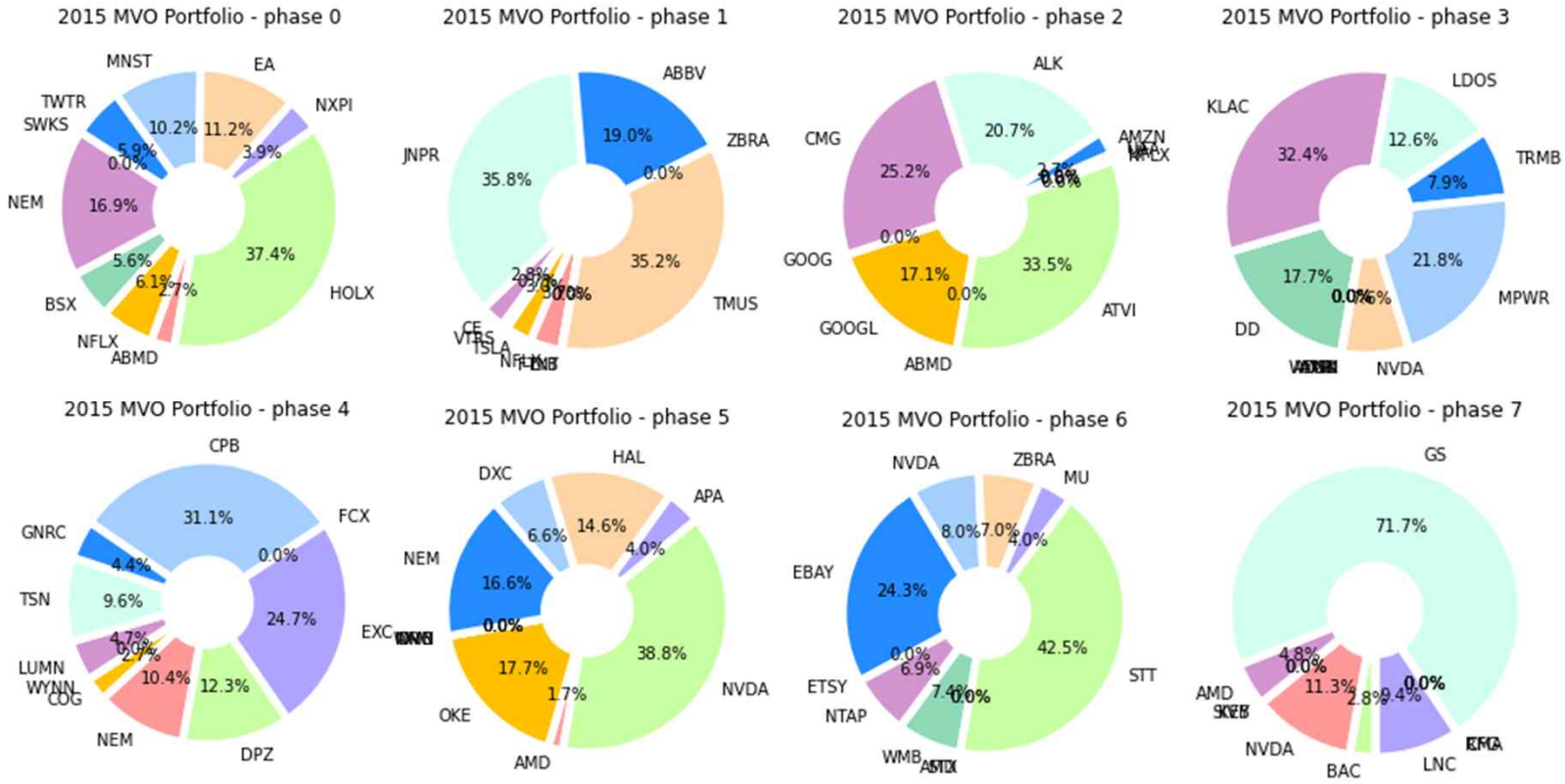
HRP Portfolios



3 Investment execution

1. 2015 ~ 2017 investment

MVO Portfolios



3 Investment execution

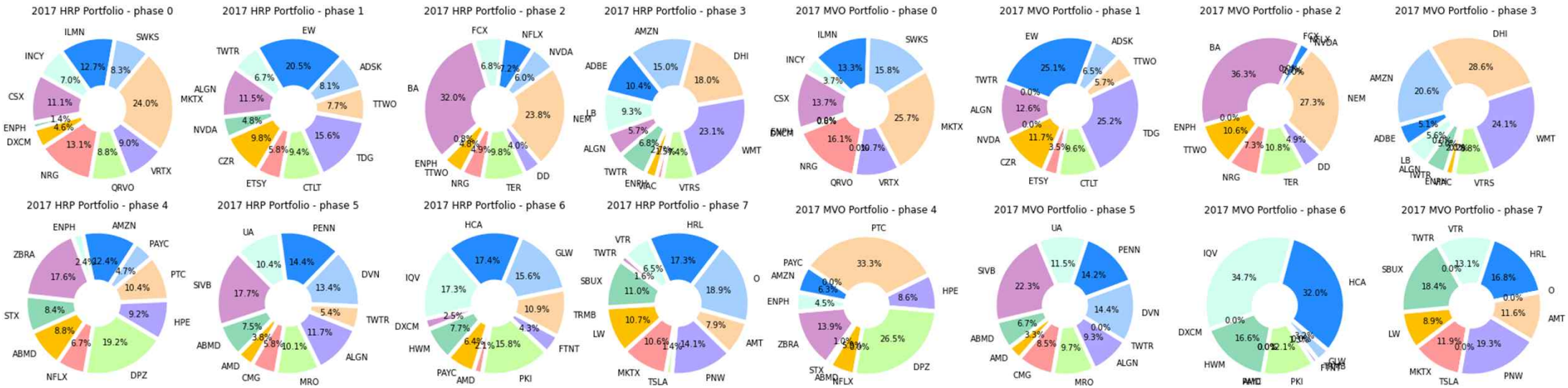
1. 2015 ~ 2017 investment

Cumulative (daily) returns

3 Investment execution

2. 2017 ~ 2019 investment

HRP & MVO Portfolios



3 Investment execution

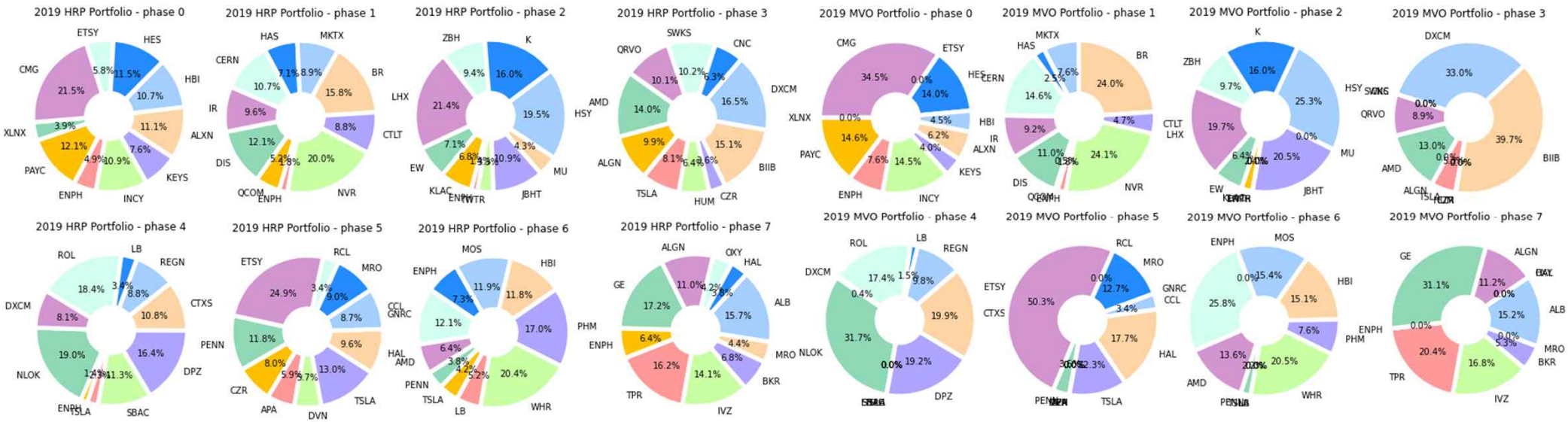
2. 2017 ~ 2019 investment

Cumulative (daily) returns

3 Investment execution

3. 2019 ~ 2021 investment

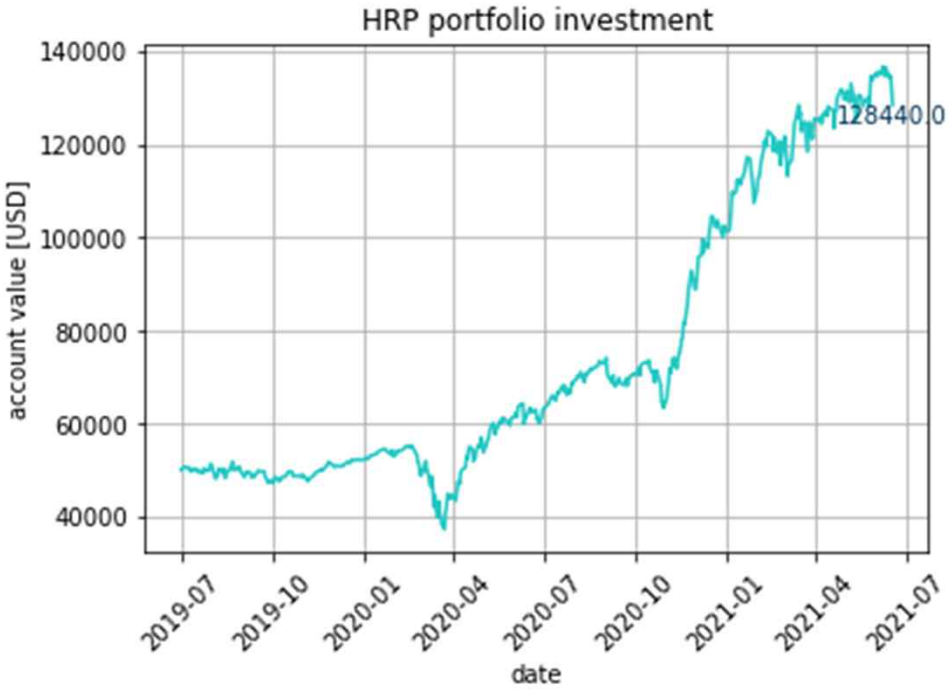
HRP & MVO Portfolios



3 Investment execution

3. 2019 ~ 2021 investment

Cumulative (daily) returns



4 Performance Evaluation

1. Evaluation

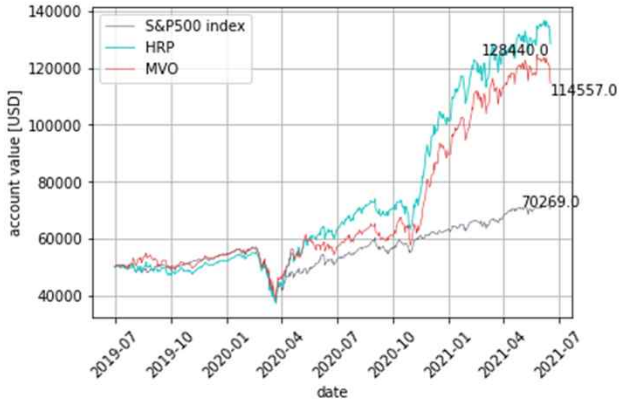
Target rate of return: 14.8% (7,399 USD)

2015 investment: 20.1% (10,032 USD)

2017 investment: 12.3% (6,154 USD)

lack of 1,245 USD

2019 investment: 156.9% (78,440 USD)



4 Performance Analysis

2. Limitations

Limitations in the strategy

Simulation part

- Since only 10 stocks was selected by ADM method, we can only construct one portfolio per each phase.
- Maybe we can make the ADM-Top 50 stocks list and randomly selecting 10 stocks method will provide a range of choices of portfolios.

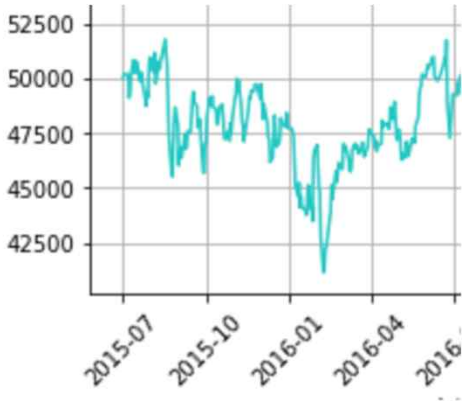
Execution part

- When the market is down, the strategy are sometimes exposed to the higher drop.
- Expanding asset classes will help. (not only in S&P500)

5 Intermediate Report

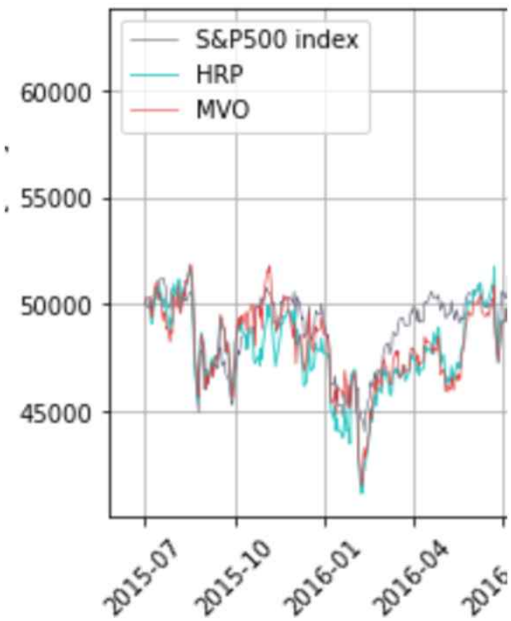
2015.07. ~ 2016.07. investment

1-year intermediate report



2016.07.01. HRP
49267 USD
-1.47 %

Annual target
7.14 %



2016.07.01. S&P500 index
50518 USD
1.04 %

Annual target 7.14 %

Keep the strategy and rebalance.
Simulate the various portfolio with Top-50 stocks list and choose the best one.